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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,927	07/05/2006	Yoshiyuki Yamamoto	050389-0065	2585

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EXAMINER

GREGORIO, GUINEVER S

ART UNIT	PAPER NUMBER
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1793

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11/13/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,927	Applicant(s) YAMAMOTO ET AL.	
	Examiner GUINEVER S. GREGORIO	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/05/2006; 09/13/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: The specification contains a few grammatical errors such as "The present invention provides diamond, and more..." (Paragraph 1, line 1) and "... has a quiet-variable..." (Paragraph 2, line 9). Please correct these and any other errors which exist in the specification.

Appropriate correction is required.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1, 4, 5, 7-8, 12, 16-17, and 19-21 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4-10 of copending Application No. 11/402,062. Although the conflicting claims are not

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identical, they are not patentably distinct from each other because birefringent retardation of the polarized light contains a fast and slow axis which is caused by the phase difference of the two orthogonal light waves and therefore since the two concepts are inter-related the claims are not patentably distinct from each other.

4. Regarding claim 5, '062 teaches a single crystalline diamond wherein a concentration of nitrogen as an impurity is 0.1 to 5 ppm which encompasses by 0.01 to 100 ppm.

5. Regarding claims 7 and 8, claim 5 of '062 teaches a single crystalline diamond according to claim 1 wherein a full width at half maximum of a rocking curve X-ray diffractometry on a (400) plane is not more than 20 arcsec across an entire of the single crystalline diamond which corresponds to claim 7. Although '062 does not teach hydrogen atom concentration it is known in the art that the crystal lattice of a diamond and the properties it exhibits are affected by the impurities found in the diamond. Therefore since the nitrogen concentrations with the present application and '062 overlap and the X-ray diffraction properties in the present application are commensurate with the properties claimed in '062 examiner is going to take the position that the hydrogen impurities found in the diamond claim by applicant in the present application and '062 are the same or similar concentration thereby making the claims obvious variants of each other.

6. Regarding claim 17, claim 6 of '062 recites a diameter of the single crystalline diamond is not less than 4 mm which overlaps with a diameter at least 10 mm.

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This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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8. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Linares et al. (US Pub. No. 2003/0131787) in view of Horikoshi Yoshiharu et al. (Japanese Pub. No. 02-252694).

9. Linares et al. teaches a single crystalline diamond structure formed by CVD process. Linares et al. does not teach using polarized light to calibrate and monitor the growth of the crystal. Therefore since Linares et al. teaches a diamond made by the same method taught by applicant, vapor phase synthesis, Examiner takes the position that the product created by Linares' method will exhibit the properties claimed by applicant such as the phase difference exhibited between two mutually linearly perpendicular polarized light irradiated on a surface of the crystal.

10. Yoshiharu et al. teaches a crystal growth monitoring device using polarized light (abstract). Yoshiharu et al. teaches a light ray source system to irradiate the growth surface of the crystal with nonpolarized light ray from a window in the vacuum container, a spectral means to make reflected light from crystal surface into homogeneous light a polarizing means to separate the homogeneous light into two different polarized light components, and light detecting means (abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a system to monitor the growth of a crystal in order to ensure the desired parameters were being produced. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use other light sources such as a laser or polarized light source in order to obtain a more accurate reading. Nonetheless, various systems have been implemented to monitor the manufacture of crystals and it would have been obvious to

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one of ordinary skill in the art at the time of the invention to use a known system or modify and existing system within reasonable means in order to obtain a crystal with the desired properties.

11. Regarding claim 2, Linares et al. teaches a thickness of 1000 micrometers which is encompassed by 100 to 1500 micrometers (paragraph 236, line 2).

12. Regarding claim 13, it is known in the art that the resistivity of an undoped diamond crystal is $10^{16} \Omega \text{ cm}$ at room temperature which overlaps with 10^{12} .

Furthermore, if one of ordinary skill in the art wants to lower the resistivity of the diamond crystal then one would merely have to dope the manufactured crystal with an impurity such as boron. Therefore one of ordinary skill in the art would be able to adjust the amount of dopant to obtain the desired resistivity.

13. Regarding claim 4, Linares et al. teaches the nitrogen content affect the electron spin resonance (paragraph 136, line 15). Therefore it would be obvious to one of ordinary skill in the art to adjust the nitrogen content of the synthetic diamond in order to obtain the desired electron spin resonance measurement.

14. Regarding claims 5 and 18, Linares et al. teaches a nitrogen content of a final CVD diamond crystal which has less than 10 to 20 ppm incorporated into the lattice which is encompassed by 0.01 to 100 ppm and overlaps with 0.01 to 5 ppm (paragraph 115, lines 16-18).

15. Regarding claim 6, Linares et al. teaches a CVD method to produce a single crystal diamond using hydrogen as the gas stream which is the same method used by

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applicant (paragraph 150, line 7). Therefore examiner takes the position that the impurities levels obtained by the prior art would commensurate with the impurity levels claimed by applicant.

16. Regarding claims 7-19 Linares et al. teaches the properties of synthetic monocrystalline diamonds depend largely on defects or impurities in the crystal (paragraph 7, lines 1-3). Furthermore, Linares et al. teaches by controlling these factors, one can control not only the electrical properties, but also other properties of the diamond, including its optical and mechanical properties (paragraph 7, lines 3-6). Linares et al. teaches varying the amount of impurities to obtain a monosynthetic diamond based with specific electrical properties (claims 1, 37, and 38). Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the impurities to the necessary amount in order to obtain the desired electrical properties. Furthermore, it is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA1980). Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum value of a cause effective variable such as amount of dopant through routine experimentation in the absence of a showing of criticality in the claimed size. *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Additionally, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum values of the relevant process

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parameters through routine experimentation in the absence of a showing of criticality. *In re Aller*, 105 USPQ 233 (CCPA 1955).

17. Regarding claims 16 and 17, examiner takes the position that the diameter of the diamond would be limited by the size of the vapor deposition device and the size of the substrate both of which one of ordinary skill in the art could easily control based on the desired size of the synthetic diamond.

18. Regarding claims 20 and 21, Linares et al. teaches applications for synthetic CVD diamonds comprising semiconductor devices, field effect transistors, light emitting diodes, high voltage switches, p-n junctions, Schottky diodes, surgical device contact surfaces, sensor devices, windows, anvils, etc. (paragraph 17).

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

20. May (CVD Diamond- A New technology for the Future? School of Chemistry, University of Bristol, Bristol BS8 1TS, U.K.) teaches the properties of diamond.

21. Landstrass et al. (Device Properties of Homoepitaxially Grown Diamond; Diamond and Related Materials; 2, pages 1033-1037; 1993) teaches analyzing layers using X-Ray topography, Raman spectroscopy, and scanning electron microscopy (paragraph 3, lines 25-28).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to GUINEVER S. GREGORIO whose telephone number is (571)270-5827. The examiner can normally be reached on Monday-Thursday, 10:30-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gsg
November 4, 2008

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793